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MENTAL STATUS OF RURAL SCHOOL CHILDREN.

REPORT OF PRELIMINARY SANITARY SURVEY MADE IN NEW CASTLE COUNTY, DELAWARE, WITH A DESCRIPTION OF THE TESTS EMPLOYED.

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At the request of the Delaware State board of health, State board of education, and Cooperative Educational Association, the United States Public Health Service undertook a sanitary survey of the rural schools of New Castle County, including the mental status of the school children. This survey is part of a series of cooperative investigations of educational, health, and sociological conditions in the State of Delaware by the Public Health Service, the National Bureau of Education, the Children's Bureau, and other agencies. In order to supply certain data desired by the Children's Bureau in their investigations, the mental survey herein reported was conducted preliminary to the general survey. It continued from January 6 to May 1, 1916.

During this investigation 3,793 children were studied. Of these, 19, or 0.5 per cent of the total, were found to be definitely feeble-minded and in need of careful supervision or institutional treatment. In addition, 50 other children, or 1.3 per cent of the total number examined, exhibited abnormal mental symptoms to such an extent as to be considered probable mental defectives.

At the beginning of this survey a majority of the school children were tested by the Binet-Simon scale, and those who showed symptoms of mental abnormality were examined by supplemental methods. The routine giving of the Binet tests to every pupil was soon replaced by a briefer sifting process for the purpose of finding those children of low intelligence or those in whom mental peculiarities existed. This brief examination was composed of questions and tests suited in a general way to the child's age and school grade.

If, during this preliminary examination or sifting process, symptoms arose which suggested mental abnormality, the case was examined more thoroughly. At this secondary examination every effort was made to arrive at a correct diagnosis in so far as one sitting would permit, and each suspected pupil was given Goddard's modification of the Binet tests, together with other tests and questions. This re-examination lasted from 20 to 50 minutes.

In the city¹ and town schools which were graded or partially graded, the children were questioned one at a time in the principal's office or other room. In practically all of the rural schools, however, the examination was conducted in the schoolroom in the presence of the teacher and pupils. When the weather became warm all the children were sent to the playground with the exception of those

¹ In the city of New Castle approximately 225 children were given the Binet-Simon examination.

belonging to one grade, each grade being called in separately for examination. During the testing the teacher was instructed to give those present various tasks which could be quietly performed at their desks. Recitations were forbidden during the examinations, as noise of any kind interfered with the testing, and especially with that form of testing known as the repetition of digits.

BINET-SIMON EXAMINATIONS.

Manner of giving tests.—In making a Binet examination each child was permitted to try every test whenever there was a possibility of his performing it.

Every pupil over 7 years of age was tested with the IX-year series of tests, because normal and abnormal pupils are met with who can qualify in all of the X-year tests and yet fail on one or more tests of the IX-year group. No Binet tests higher than the XII-year series were used, since tests devised for higher age groups have not proved reliable.¹

Result.—The results of the Binet-Simon examination of 209 normal children, 174 white and 35 colored, in the city of New Castle, are presented in the subjoined table:

TABLE I.—Binet ages of 209 normal children (174 white, 34 colored) in the city of New Castle.

Chronological age.	Mental age.																				Number of children.
	12	11.8	11.6	11.4	11.2	11	10.8	10.6	10.4	10.2	10	9.8	9.6	9.4	9.2	9	8.8	8.6	8.4	8.2	
15.....	1																				3
14.5.....																					2
14.....																					5
13.5.....																					8
13.....																					7
12.5.....																					11
12.....																					11
11.5.....																					13
11.....																					18
10.5.....																					13
10.....																					16
9.5.....																					13
9.....																					15
8.5.....																					17
8.....																					21
7.5.....																					11
7.....																					11
6.5.....																					0
6.....																					14
Total..	1	1	4	7	8	12	16	14	13	11	16	10	6	9	15	13	11	6	6	3	209

¹ In the IX-year group of tests the subtraction of 4 from 20 abstractly was used instead of the actual counting out of change.

In the XI-year series, the giving of 20 words in 30 seconds was considered the equivalent of giving 60 words in 3 minutes. This consideration was based on some previous experimental work.

The dissected sentences of the XI-year series, according to Goddard's correction of April, 1913, were used.

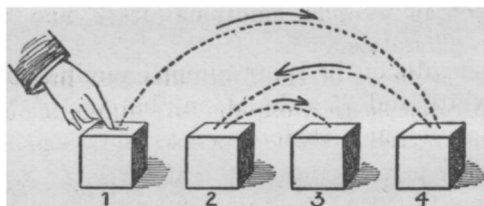
In the "Resisting suggestion" test of the XII-year group, two correct judgments out of the last three judgments were scored as a satisfactory reply.

Although 209 Binet examinations are a small number, this table shows the wide variation which exists in the Binet ages of children who are not considered defective.

SIFTING PROCESS.

On January 27 the sifting process replaced the routine Binet examination, beginning with the seventh grade of the New Castle School. The sifting method, and reexamining when necessary by the Binet and other methods, was continued throughout the survey.

The weeding out process was instituted simply to bring out the child's mentation in order that subnormal or abnormal suspects could be separated from the average children. It is believed that almost any simple test or series of simple tests could be used for this purpose. After due consideration, the cube test, the repetition of digits, and problem were selected. These three tests, occupying



about four or five minutes, were thenceforth used in the examination of every child.

Cube Test.

The cube test, which has proved its usefulness in the mental examination of arriving immigrants, was the first test given to each child. This test consists in the touching of four or five cubes by the examiner in a definite order, immediately after which the subject strives to imitate the examiner, touching the same cubes in the same order.

In the diagram four cubes are represented. They are on a table immediately in front of the subject. The movement here depicted shows that the examiner is touching cube 1 with his finger, after which he immediately touches cube 4, then after a slight pause (one-half to two seconds) he touches cube 2, and immediately afterwards cube 3. The subject then imitates the examiner. The examiner next touches the four blocks in a different order, which operation in turn is executed by the subject.

The following six movements were selected for the four-cube test, the numbers indicating the different cubes:

First.....	1	4	2	3	Fourth.....	4	2	3	1
Second.....	1	3	4	2	Fifth.....	3	2	4	1
Third.....	1	3	2	4	Sixth.....	2	4	1	3

The execution of these six movements on the part of the examiner and the repetition of them by the subject ordinarily requires from 40 to 60 seconds. Two trials were allowed only for the first movement.

The following four movements were used in the five-cube test. The longer spaces between the digits indicate a time interval of from one and one-half to two seconds; in other words, a distinct pause occurred midway in the movement.

First.....	1	4	5	2	3	Third.....	5	1	3	4	2
Second.....	2	4	1	3	5	Fourth.....	4	3	5	2	1

In giving the cube test, a sufficient time mentally to recover was allowed after each movement. The weighted cubes used in the weight-discrimination test were used for this test.

During the cube test the subject was carefully observed. His general get-up, facial expression, amount of self-reliance, power of comprehension, muscular control, rapidity of movement, attention over a period of 45 seconds, emotional state, and accuracy of performance were all noticed.

The fourth movement of the four-cube test brought out the subject's power to resist suggestion, and the different movements of the five-cube test permitted analytic processes to take place. Good vision is essential for the performance of this test.

The five-cube test was used in the sixth, seventh, and eighth grades. Children of the lower grades were examined with the four-cube test.

Most of the children in the upper grades succeeded in performing two movements out of the four movements with the five-cube test, this being considered satisfactory. Whenever a subject succeeded in all four movements with the five-cube test his general examination record was usually excellent.

Ability to succeed in at least four movements out of the six movements with the four-cube test was considered a satisfactory performance. Satisfactory performances with this test are not accomplished until the child reaches the age of eight. This is proven by the tables inserted below. These show how 1,393 white children between the ages of 6 and 10 in the rural schools of New Castle County performed the four-cube test.

TABLE II.—*Four-cube test.*

Record of 1,393 white children in New Castle County, Del.

178 children, age 6.

14 children accomplished 6 movements	} 64 children, or 36 per cent, succeeded in 4 movements.
20 children accomplished 5 movements	
30 children accomplished 4 movements	
28 children accomplished 3 movements	
35 children accomplished 2 movements	
19 children accomplished 1 movement.	
32 children accomplished 0 movement.	114 children.

TABLE II.—*Four-cube test*—Continued.*155 children, age 7.*

14 children accomplished 6 movements	85 children, or 63 per cent, succeeded in 4 movements.
36 children accomplished 5 movements	
35 children accomplished 4 movements	
16 children accomplished 3 movements	
14 children accomplished 2 movements	
12 children accomplished 1 movement	50 children.
8 children accomplished 0 movement	

147 children, age 7½.

23 children accomplished 6 movements	104 children, or 71 per cent, succeeded in 4 movements.
48 children accomplished 5 movements	
33 children accomplished 4 movements	
17 children accomplished 3 movements	
19 children accomplished 2 movements	
5 children accomplished 1 movement	43 children.
2 children accomplished 0 movement	

174 children, age 8.

40 children accomplished 6 movements	133 children, or 76 per cent, succeeded in 4 movements.
49 children accomplished 5 movements	
44 children accomplished 4 movements	
24 children accomplished 3 movements	
7 children accomplished 2 movements	
5 children accomplished 1 movement	41 children.
5 children accomplished 0 movement	

192 children, age 8½.

55 children accomplished 6 movements	150 children, or 78 per cent, succeeded in 4 movements.
52 children accomplished 5 movements	
43 children accomplished 4 movements	
31 children accomplished 3 movements	
9 children accomplished 2 movements	
1 child accomplished 1 movement....	42 children.
1 child accomplished 0 movement....	

170 children, age 9.

61 children accomplished 6 movements	131 children, or 77 per cent, succeeded in 4 movements.
47 children accomplished 5 movements	
23 children accomplished 4 movements	
23 children accomplished 3 movements	
12 children accomplished 2 movements	
4 children accomplished 0 movement	39 children.

230 children, age 9½.

92 children accomplished 6 movements	211 children, or 92 per cent, succeeded in 4 movements.
77 children accomplished 5 movements	
42 children accomplished 4 movements	
13 children accomplished 3 movements	
5 children accomplished 2 movements	
1 child accomplished 0 movement....	19 children.

167 children, age 10.

51 children accomplished 6 movements	138 children, or 83 per cent, succeeded in 4 movements.
56 children accomplished 5 movements	
31 children accomplished 4 movements	
20 children accomplished 3 movements	
4 children accomplished 2 movements	
1 child accomplished 1 movement....	29 children.
4 children accomplished 0 movement	

Repetition of Digits.

The repetition of digits followed the cube test. In giving this test the examiner gave the digits rather rapidly, allowing a small interval of time to occur midway in the enunciation of the digits. This small interval of time, less than a second, may be represented by a space in the following series: 179 286; 1395 847; 4792 3815. The tone of the examiner's voice in propounding this test may be characterized by the term "musical." The usual enunciation in monotone of each digit, recommended in textbooks on psychology, was not used.

With one exception, two trials were given for the repetition of each series of digits; that is, the subject was given two trials to repeat six digits, two trials to repeat eight digits, and so on, a different series of numbers being used. The exception above referred to is as follows: When a subject had reached the age of 12 he was given seven or eight trials, if necessary, to repeat seven digits. The time spacings between the different digits were varied at each trial. These variations may be thus represented: 179 2864; 1495 387; 59 17 28 4.

If a child of 12 or over was unable to repeat seven digits after several trials, the examiner would say to him:

Just listen. Do not say these numbers to yourself. Say them quickly to me as soon as I finish.

This is a test in sound. If you stop to think of these numbers you will lose them. Just say them quickly to me.

Every effort was made to get the child of 12 years and above to repeat seven digits. It was found that among the children examined the failure of those of 12 and over to repeat seven digits was a symptom in many instances of mental deficiency. As a rule, it was found that children thus failing made a poor showing in many of the other mental tests. A number of mentally defective persons who were able to repeat six digits at first soon tired in their effort to repeat seven, became inattentive, and later were unable even to repeat six.

The following tables show the digit repeating ability or memory span of 3,488 children examined in New Castle County. One girl, age 14, repeated 13 digits. No other pupil was able to repeat 12 digits. Seven children, six girls and one boy, repeated 11 digits. These were the best records made during this test. The colored children did relatively better work in repeating digits than they did in the other sifting tests. These tables show that children between the ages of 7 and 11 can repeat six digits.

TABLE III.—*Repetition of digits.*

White children of New Castle County, Del.; 1,612 boys examined; 1,429 girls examined.			
73 boys, age 15 and above.		79 girls, age 15 and above.	
	Digits.		Digits.
1 boy repeated.....	10	1 girl repeated.....	10
8 boys repeated.....	9	7 girls repeated.....	9
23 boys repeated.....	8	23 girls repeated.....	8
22 boys repeated.....	7	31 girls repeated.....	7
16 boys repeated.....	6	15 girls repeated.....	6
2 boys repeated.....	5	1 girl repeated.....	5
1 boy repeated.....	4	1 girl repeated.....	4
53 boys, age 14½.		56 girls, age 14½.	
1 boy repeated.....	10	5 girls repeated.....	10
6 boys repeated.....	9	8 girls repeated.....	9
20 boys repeated.....	8	11 girls repeated.....	8
22 boys repeated.....	7	25 girls repeated.....	7
8 boys repeated.....	6	6 girls repeated.....	6
1 boy repeated.....	5	1 girl repeated.....	4

TABLE III.—*Repetition of digits*—Continued.

White children of New Castle County, Del.; 1,612 boys examined: 1,429 girls examined—Continued.

74 boys, age 14.		59 girls, age 14.	
1 boy repeated.....	11	1 girl repeated.....	13
4 boys repeated.....	9	3 girls repeated.....	10
28 boys repeated.....	8	7 girls repeated.....	9
28 boys repeated.....	7	15 girls repeated.....	8
11 boys repeated.....	6	22 girls repeated.....	7
1 boy repeated.....	5	9 girls repeated.....	6
1 boy repeated.....	4	2 girls repeated.....	5
92 boys, age 13½.		95 girls, age 13½.	
4 boys repeated.....	10	2 girls repeated.....	11
10 boys repeated.....	9	5 girls repeated.....	10
29 boys repeated.....	8	7 girls repeated.....	9
38 boys repeated.....	7	31 girls repeated.....	8
11 boys repeated.....	6	32 girls repeated.....	7
		17 girls repeated.....	6
		1 girl repeated.....	5
98 boys, age 13.		91 girls, age 13.	
4 boys repeated.....	10	1 girl repeated.....	11
10 boys repeated.....	9	3 girls repeated.....	10
24 boys repeated.....	8	9 girls repeated.....	9
38 boys repeated.....	7	29 girls repeated.....	8
21 boys repeated.....	6	35 girls repeated.....	7
1 boy repeated.....	5	10 girls repeated.....	6
		4 girls repeated.....	5
101 boys, age 12½.		76 girls, age 12½.	
6 boys repeated.....	9	1 girl repeated.....	10
34 boys repeated.....	8	4 girls repeated.....	9
44 boys repeated.....	7	25 girls repeated.....	8
17 boys repeated.....	6	32 girls repeated.....	7
		12 girls repeated.....	6
		2 girls repeated.....	5
89 boys, age 12.		86 girls, age 12.	
1 boy repeated.....	10	1 girl repeated.....	11
6 boys repeated.....	9	8 girls repeated.....	9
19 boys repeated.....	8	24 girls repeated.....	8
46 boys repeated.....	7	28 girls repeated.....	7
16 boys repeated.....	6	21 girls repeated.....	6
1 boy repeated.....	4	3 girls repeated.....	5
		1 girl repeated.....	4
83 boys, age 11½.		91 girls, age 11½.	
4 boys repeated.....	10	1 girl repeated.....	11
8 boys repeated.....	9	2 girls repeated.....	10
11 boys repeated.....	8	5 girls repeated.....	9
36 boys repeated.....	7	16 girls repeated.....	8
21 boys repeated.....	6	29 girls repeated.....	7
3 boys repeated.....	5	33 girls repeated.....	6
		4 girls repeated.....	5
		1 girl repeated.....	4
81 boys, age 11.		82 girls, age 11.	
6 boys repeated.....	9	3 girls repeated.....	10
13 boys repeated.....	8	2 girls repeated.....	9
31 boys repeated.....	7	18 girls repeated.....	8
24 boys repeated.....	6	34 girls repeated.....	7
2 boys repeated.....	5	24 girls repeated.....	6
		1 girl repeated.....	5
109 boys, age 10½.		77 girls, age 10½.	
1 boy repeated.....	10	2 girls repeated.....	10
5 boys repeated.....	9	3 girls repeated.....	9
17 boys repeated.....	8	11 girls repeated.....	8
47 boys repeated.....	7	30 girls repeated.....	7
35 boys repeated.....	6	28 girls repeated.....	6
2 boys repeated.....	5	3 girls repeated.....	5
2 boys repeated.....	4		
89 boys, age 10.		79 girls, age 10.	
1 boy repeated.....	9	2 girls repeated.....	10
9 boys repeated.....	8	3 girls repeated.....	9
33 boys repeated.....	7	18 girls repeated.....	8
42 boys repeated.....	6	29 girls repeated.....	7
2 boys repeated.....	5	23 girls repeated.....	6
2 boys repeated.....	4	4 girls repeated.....	5
131 boys, age 9½.		101 girls, age 9½.	
2 boys repeated.....	9	3 girls repeated.....	9
16 boys repeated.....	8	15 girls repeated.....	8
59 boys repeated.....	7	36 girls repeated.....	7
54 boys repeated.....	6	42 girls repeated.....	6
8 boys repeated.....	5	5 girls repeated.....	5
1 boy repeated.....	4		

TABLE III.—*Repetition of digits*—Continued.

White children of New Castle County, Del.; 1,612 boys examined; 1,429 girls examined—Continued.

<i>89 boys, age 9.</i>		<i>78 girls, age 9.</i>	
1 boy repeated.....	10	2 girls repeated.....	9
5 boys repeated.....	8	12 girls repeated.....	8
30 boys repeated.....	7	23 girls repeated.....	7
44 boys repeated.....	6	37 girls repeated.....	6
9 boys repeated.....	5	2 girls repeated.....	5
		2 girls repeated.....	4
<i>101 boys, age 8½.</i>		<i>88 girls, age 8½.</i>	
1 boy repeated.....	10	1 girl repeated.....	10
2 boys repeated.....	9	2 girls repeated.....	9
10 boys repeated.....	8	7 girls repeated.....	8
38 boys repeated.....	7	29 girls repeated.....	7
35 boys repeated.....	6	37 girls repeated.....	6
13 boys repeated.....	5	10 girls repeated.....	5
2 boys repeated.....	4	2 girls repeated.....	4
<i>97 boys, age 8.</i>		<i>71 girls, age 8.</i>	
2 boys repeated.....	9	6 girls repeated.....	8
5 boys repeated.....	8	15 girls repeated.....	7
27 boys repeated.....	7	42 girls repeated.....	6
46 boys repeated.....	6	7 girls repeated.....	5
14 boys repeated.....	5	1 girl repeated.....	4
3 boys repeated.....	4		
<i>69 boys, age 7½.</i>		<i>82 girls, age 7½.</i>	
1 boy repeated.....	9	2 girls repeated.....	10
1 boy repeated.....	8	6 girls repeated.....	8
16 boys repeated.....	7	17 girls repeated.....	7
41 boys repeated.....	6	45 girls repeated.....	6
7 boys repeated.....	5	11 girls repeated.....	5
3 boys repeated.....	4	1 girl repeated.....	4
<i>69 boys, age 7.</i>		<i>66 girls, age 7.</i>	
2 boys repeated.....	8	1 girl repeated.....	9
11 boys repeated.....	7	2 girls repeated.....	8
41 boys repeated.....	6	18 girls repeated.....	7
12 boys repeated.....	5	36 girls repeated.....	6
2 boys repeated.....	4	8 girls repeated.....	5
1 boy repeated.....	3	1 girl repeated.....	4
<i>100 boys, age 6.</i>		<i>72 girls, age 6.</i>	
1 boy repeated.....	9	1 girl repeated.....	8
11 boys repeated.....	7	10 girls repeated.....	7
43 boys repeated.....	6	28 girls repeated.....	6
35 boys repeated.....	5	21 girls repeated.....	5
17 boys repeated.....	4	11 girls repeated.....	4
1 boy repeated.....	3	1 girl repeated.....	3
1 boy repeated.....	2		
Colored children of New Castle County, Del.; 202 boys; 245 girls.			
<i>21 boys, age 15 and above.</i>		<i>21 girls, age 15 and above.</i>	
	Digits.		Digits.
1 boy repeated.....	10	1 girl repeated.....	9
2 boys repeated.....	9	8 girls repeated.....	8
6 boys repeated.....	8	8 girls repeated.....	7
9 boys repeated.....	7	4 girls repeated.....	6
3 boys repeated.....	6		
<i>12 boys, age 14½.</i>		<i>9 girls, age 14½.</i>	
1 boy repeated.....	10	3 girls repeated.....	9
2 boys repeated.....	9	2 girls repeated.....	8
3 boys repeated.....	8	3 girls repeated.....	7
6 boys repeated.....	7	1 girl repeated.....	6
<i>6 boys, age 14.</i>		<i>7 girls, age 14.</i>	
3 boys repeated.....	8	1 girl repeated.....	8
3 boys repeated.....	7	3 girls repeated.....	7
		3 girls repeated.....	6
<i>11 boys, age 13½.</i>		<i>12 girls, age 13½.</i>	
3 boys repeated.....	8	5 girls repeated.....	8
5 boys repeated.....	7	4 girls repeated.....	7
3 boys repeated.....	6	3 girls repeated.....	6
<i>5 boys, age 13.</i>		<i>9 girls, age 13.</i>	
2 boys repeated.....	8	1 girl repeated.....	9
1 boy repeated.....	7	4 girls repeated.....	8
1 boy repeated.....	6	3 girls repeated.....	7
1 boy repeated.....	5	1 girl repeated.....	6

TABLE III.—*Repetition of digits*—Continued.

Colored children of New Castle County, Del.; 202 boys; 245 girls—Continued.

<i>11 boys, age 12½.</i>		<i>13 girls, age 12½.</i>	
5 boys repeated	8	2 girls repeated	8
2 boys repeated	7	6 girls repeated	7
3 boys repeated	6	5 girls repeated	6
1 boy repeated	5		
<i>14 boys, age 12.</i>		<i>22 girls, age 12.</i>	
1 boy repeated	10	1 girl repeated	11
5 boys repeated	8	2 girls repeated	9
3 boys repeated	7	4 girls repeated	8
4 boys repeated	6	7 girls repeated	7
1 boy repeated	5	8 girls repeated	6
<i>15 boys, age 11½.</i>		<i>20 girls, age 11½.</i>	
4 boys repeated	8	2 girls repeated	9
9 boys repeated	7	4 girls repeated	8
1 boy repeated	6	7 girls repeated	7
1 boy repeated	4	6 girls repeated	6
		1 girl repeated	5
<i>10 boys, age 11.</i>		<i>15 girls, age 11.</i>	
1 boy repeated	10	4 girls repeated	8
1 boy repeated	9	7 girls repeated	7
6 boys repeated	7	2 girls repeated	6
2 boys repeated	6	1 girl repeated	5
		1 girl repeated	4
<i>14 boys, age 10½.</i>		<i>17 girls, age 10½.</i>	
4 boys repeated	8	3 girls repeated	8
4 boys repeated	7	10 girls repeated	7
6 boys repeated	6	4 girls repeated	6
<i>9 boys, age 10.</i>		<i>12 girls, age 10.</i>	
1 boy repeated	8	1 girl repeated	9
1 boy repeated	7	2 girls repeated	8
6 boys repeated	6	3 girls repeated	7
1 boy repeated	5	6 girls repeated	6
<i>15 boys, age 9½.</i>		<i>12 girls, age 9½.</i>	
2 boys repeated	8	2 girls repeated	8
8 boys repeated	7	6 girls repeated	7
5 boys repeated	6	4 girls repeated	6
<i>5 boys, age 9.</i>		<i>17 girls, age 9.</i>	
1 boy repeated	8	1 girl repeated	9
2 boys repeated	7	5 girls repeated	7
2 boys repeated	6	9 girls repeated	6
		2 girls repeated	5
<i>10 boys, age 8½.</i>		<i>9 girls, age 8½.</i>	
2 boys repeated	8	1 girl repeated	8
7 boys repeated	6	4 girls repeated	7
1 boy repeated	5	4 girls repeated	6
<i>9 boys, age 8.</i>		<i>16 girls, age 8.</i>	
3 boys repeated	7	7 girls repeated	7
4 boys repeated	6	8 girls repeated	6
2 boys repeated	5	1 girl repeated	5
<i>12 boys, age 7½.</i>		<i>6 girls, age 7½.</i>	
1 boy repeated	8	2 girls repeated	7
4 boys repeated	7	3 girls repeated	6
3 boys repeated	6	1 girl repeated	5
4 boys repeated	5		
<i>15 boys, age 7.</i>		<i>15 girls, age 7.</i>	
1 boy repeated	8	1 girl repeated	9
1 boy repeated	7	1 girl repeated	8
10 boys repeated	6	3 girls repeated	7
3 boys repeated	5	9 girls repeated	6
		1 girl repeated	5
<i>8 boys, age 6.</i>		<i>13 girls, age 6.</i>	
8 boys repeated	6	4 girls repeated	7
		6 girls repeated	6
		2 girls repeated	5
		1 girl repeated	3

Problems.

During the sifting process, the examiner propounded a problem in mental arithmetic to each child. Two trials were allowed.

Children of the sixth, seventh, and eighth grades were given the same kind of problems (each child being given the 30-cent problem, the three-fourths problem, and the two-fifths problem). When the child failed in the three-fourths problem, however, the last one was not given. These problems were as follows:

Thirty-cent problem: "If you have 30 cents and go to the post office and buy two 2-cent stamps, two 1-cent stamps, and two postal cards, how much money will you have left?" Or, "If you have 30 cents and go to the post office and buy three 2-cent stamps, three 1-cent stamps, and three postal cards, how much money will you have left?"

These problems may be thus expressed:

$$30 \text{ cents} - (2 \text{ 2's} + 2 \text{ 1's} + 2 \text{ p's}) = ?$$

$$30 \text{ cents} - (3 \text{ 2's} + 3 \text{ 1's} + 3 \text{ p's}) = ?$$

$$30 \text{ cents} - (4 \text{ 2's} + 4 \text{ 1's} + 4 \text{ p's}) = ?$$

$$30 \text{ cents} - (5 \text{ 2's} + 5 \text{ 1's} + 5 \text{ p's}) = ?$$

$$30 \text{ cents} - (6 \text{ 2's} + 6 \text{ 1's} + 6 \text{ p's}) = ?$$

Three-fourths problem: "If three-fourths of a farm cost \$600, what will the whole farm cost?" Or, "If three-fourths of a farm cost \$1,200, what will the whole farm cost?" and so on.

Two-fifths problem: "If two-fifths of a farm cost \$800, what will one-half of the same farm cost?" "If two-fifths of a farm cost \$1,200, what will one-half of the same farm cost?" "If two-fifths of a farm cost \$2,400, what will one-half of the same farm cost?"

In the fifth grade, the fraction problems were not used, the 30-cent problem alone being given. In the fourth grade the 20-cent problem was used:

Twenty-cent problem: "If you have 20 cents, and go to the post office and buy two 2-cent stamps and two 1-cent stamps, how much money will you have left?"

These problems may be thus represented:

$$20 \text{ cents} - (2 \text{ 1's} + 2 \text{ 2's}) = ?$$

$$20 \text{ cents} - (3 \text{ 1's} + 3 \text{ 2's}) = ?$$

$$20 \text{ cents} - (4 \text{ 1's} + 4 \text{ 2's}) = ?$$

$$20 \text{ cents} - (5 \text{ 1's} + 5 \text{ 2's}) = ?$$

$$20 \text{ cents} - (6 \text{ 1's} + 6 \text{ 2's}) = ?$$

In the third grade the 20-cent problem was given in a simpler form:

Twenty-cent problem (third grade): "If you have 20 cents and spend 2 cents for bread and 2 cents for butter, how much money will you have left?" In each case the base number, 20, was retained, thus:

$$20 \text{ cents} - (2+2) = ?$$

$$20 \text{ cents} - (3+3) = ?$$

$$20 \text{ cents} - (4+4) = ?$$

$$20 \text{ cents} - (6+6) = ?$$

In the second grade the 10-cent problem was used:

$$10 - (1+1) = ?$$

$$10 - (2+4) = ?$$

$$10 - (3+3) = ?$$

$$10 - (5+2) = ?$$

$$10 - (5+3) = ?$$

$$10 - (1+5) = ?$$

The children in the first grade were given the finger problem:

Finger problem. "I have five fingers (the examiner holding up his left hand and showing the five fingers), and if I take a knife and cut off these two fingers, how many fingers will be left on that hand?" Variations may be thus represented:

$$5-2=?$$

$$5-1=?$$

$$5-3=?, \text{ etc.}$$

These problems throw light on the reasoning and learning ability of the children, as well as upon the quality of teaching they have received.

The sifting process, or examination by means of the cube test, memory span, and problem, was given to all the children of New Castle County, with the exception of about 215 in the schools of the city of New Castle.

SECONDARY EXAMINATION.

Nature.

If at the primary examination symptoms of mental abnormality occurred, the case was gone into more thoroughly. At the reexamination a Binet examination was made which occupied 20 minutes. Some other tests and questions were also propounded as the examiner deemed necessary. Some of these were:

Reading.

Spelling.

Questions on general information suited to the subject's environment.

Cube test.

Days of the week backward.

Months backward.

Spelling backward.

Counting backward.

Interpretation of pictures upside down.

Arithmetic { Addition series.
Problems.

Counting money.

Telling time.

The subject was further tested by teaching him arithmetical processes step by step, grounding him first in concrete relationships and afterwards in abstractions. His ability to see into, catch on, retain, and improve was carefully observed. This testing was planned to throw light upon the subject's attention, memory, learning power, reasoning ability, and emotional state. In many cases considerable information in regard to his intelligence and emotional state was obtained in this way. In addition to the above tests, questions were put to the subject as thought feasible, in order to bring to light the whys and wherefores regarding his attitudes, interests, habits, emotional states, and health. His ordinary judgment or common sense was always inquired into. A physical examination was made

when necessary; special attention being directed to the vision, hearing, and neurological side.

Brothers and sisters of the suspect as well as his teacher and principal were questioned. This was done in order to find data which would bear upon the past medical history, school history, and family history of the suspect.

In addition, the character of the teaching which the child had received, together with the general tenor of the class or school, was considered.

The age, sex, and especially the race of the child was constantly kept in mind.

Results.

As a result of this survey a group of 19 mentally defective children are presented. These cases are distinctive and positive. There are also 50 cases to which the term "suspicions of mental deficiency" is applied. Eight epileptics were found during the survey. Finally, there is a group of peculiar children which may be designated as the psychopathic group. No attempt was made to study this group minutely.

TABLE IV.—*Abnormal children I.*

19 MENTAL DEFECTIVES.

Case.	Race.	Sex.	Age.	Grade.	Binet age.
1.....	Colored	Male	18 years.....	Ungraded.	7.2
2.....	do.	Female	17 years, 8 months.....	I	6.2
3.....	White	do.	16 years, 8 months.....	V and VI	8.6
4.....	do.	do.	15 years, 8 months.....	III	.....
5.....	do.	do.	14 years, 6 months.....	I	5.8
6.....	do.	Male	14 years, 2 months.....	I	7.4
7.....	do.	Female	14 years.....	VII	7.2
8.....	do.	Male	13 years, 7 months.....	IV	9.8
9.....	do.	do.	13 years.....	IV	.....
10.....	do.	Female	12 years, 11 months.....	II	7.2
11.....	do.	Male	12 years, 5 months.....	II	9.4
12.....	do.	Female	11 years, 6 months.....	.....	8
13.....	do.	Male	11 years, 1 month.....	Ungraded.	3
14.....	do.	do.	10 years, 5 months.....	I	3.2
15.....	do.	do.	10 years.....	I	6.4
16.....	do.	do.	9 years.....	I	4.6
17.....	Colored	do.	do.....	Ungraded.	4
18.....	White	Female	do.....	I	5
19.....	Colored	do.	8 years, 11 months.....	I	5

50 MENTAL DEFECTIVES (SUSPICIOUS).

20.....	Colored	Male	16 years, 10 months.....	I	7.2
21.....	White	Female	16 years, 11 months.....	VI	10.6
22.....	do.	Male	16 years, 1 month.....	VI	11
23.....	do.	do.	15 years, 7 months.....	V	11.2
24.....	do.	do.	15 years, 4 months.....	VI	9.4
25.....	do.	do.	15 years.....	V	.....
26.....	do.	Female	14 years, 7 months.....	V and VI	.....
27.....	do.	Male	14 years.....	VII	10.2
28.....	do.	Female	do.....	V	9.8
29.....	do.	do.	13 years, 11 months.....	IV	9.6
30.....	Colored	Male	13 years, 10 months.....	IV	8.8
31.....	White	do.	13 years, 9 months.....	V	10.2
32.....	do.	Female	13 years, 7 months.....	V	10.4
33.....	do.	Male	do.....	IV	9.2
34.....	do.	Female	13 years, 6 months.....	IV	9.4
35.....	do.	do.	13 years, $\frac{1}{2}$ month.....	.....	9.6
36.....	do.	Male	13 years.....	III	10.6
37.....	do.	Female	12 years, 11 months.....	III	8.6
38.....	do.	Male	12 years, 10 months.....	I	7.4

TABLE IV.—*Abnormal children I*—Continued.

50 MENTAL DEFECTIVES (SUSPICIOUS)—Continued.

Case.	Race.	Sex.	Age.	Grade.	Binet age.
39.....	White.....	Male.....	12 years, 6 months.....	IV	8.4
40.....	Colored.....	do.....	do.....	I	7
41.....	White.....	do.....	12 years, 5 months.....	IV	10
42.....	do.....	do.....	12 years, 4 months.....	VI	11.4
43.....	Colored.....	Female.....	12 years, 3 months.....	.....	8.8
44.....	do.....	Male.....	12 years, 2 months.....	I	8.6
45.....	White.....	do.....	12 years, 1½ months.....	III	8.6
46.....	Colored.....	Female.....	12 years.....	I	7.8
47.....	do.....	do.....	do.....	II	9.8
48.....	do.....	do.....	11 years.....	I and IV	8.8
49.....	White.....	do.....	do.....	II	8
50.....	do.....	Male.....	10 years, 5 months.....	I	6.6
51.....	do.....	do.....	do.....	I	7.4
52.....	do.....	Female.....	do.....	II	8.8
53.....	do.....	Male.....	10 years.....	I	6.4
54.....	do.....	Female.....	do.....	I	7.2
55.....	do.....	do.....	9 years, 9 months.....	.....	8.2
56.....	do.....	do.....	do.....	I	7.4
57.....	Colored.....	Male.....	9 years, 7½ months.....	I	7.8
58.....	White.....	do.....	9 years, 6 months.....	II	7.2
59.....	do.....	do.....	9 years.....	II	6.8
60.....	do.....	do.....	do.....	II	.....
61.....	do.....	do.....	do.....	II	6.3
62.....	Colored.....	Female.....	do.....	I	7.2
63.....	White.....	Male.....	8 years, 7 months.....	I	5.8
64.....	do.....	do.....	8 years, 3 months.....	I	6.4
65.....	do.....	do.....	7 years, 10 months.....	I	4
66.....	do.....	Female.....	7 years, 6 months.....	P	4.4
67.....	Colored.....	do.....	7 years, 2 months.....	I	4.4
68.....	White.....	do.....	6 years, 5 months.....	P	4.2
69.....	do.....	Male.....	6 years.....	I	4.6

8. EPILEPTICS.

70.....	Colored.....	Male.....	18 years, 7 months.....	VI	11.0
71.....	White.....	do.....	14 years, 6 months.....	V	10.6
72.....	do.....	Female.....	14 years, 2 months.....	.....	9.6
73.....	do.....	Male.....	13 years, 11½ months.....	VIII	11.2
74.....	do.....	do.....	12 years, 6 months.....	VI	11
75.....	do.....	do.....	11 years.....	II	8.8
76.....	Colored.....	do.....	10 years.....	I, II, III	7.4
77.....	do.....	Female.....	7 years, 5 months.....	I	7.2

9. SUBNORMAL CHILDREN WHO GIVE A HISTORY OF ATTACKS OF UNCONSCIOUSNESS.

78.....	White.....	Male.....	16 years, 6 months.....	V	9.4
79.....	do.....	do.....	15 years, 3 months.....	VI	11.2
80.....	do.....	do.....	13 years, 11 months.....	VI	11
81.....	Colored.....	do.....	13 years, 6 months.....	V	10.2
82.....	White.....	do.....	12 years, 6 months.....	IV	9.6
83.....	do.....	Female.....	11 years, 3½ months.....	IV	9.2
84.....	do.....	do.....	10 years, 6 months.....	III	9.2
85.....	do.....	do.....	9 years, 8 months.....	.....	7.4
86.....	do.....	Male.....	6 years.....	I	5.6

PECULIAR CHILDREN.

87.....	White.....	Male.....	14 years, 10 months.....	VII	11.8
88.....	do.....	do.....	14 years.....	IV	10.4
89.....	do.....	do.....	13 years.....	IV	.....
90.....	do.....	Female.....	12 years, 8 months.....	.....	.....
91.....	do.....	do.....	12 years, 6 months.....	III	10.2
92.....	do.....	do.....	do.....	IV	11
93.....	do.....	do.....	12 years, 4 months.....	VI	9.8
94.....	do.....	do.....	12 years.....	V	10.4
95.....	do.....	do.....	11 years, 10 months.....	IV	8.4
96.....	do.....	do.....	11 years, 2 months.....	III	9.2
97.....	do.....	Male.....	9 years.....	III	8
98.....	do.....	do.....	7 years, 11 months.....	I	8
99.....	do.....	do.....	7 years.....	I	8

CONCLUSIONS AND RECOMMENDATIONS.

1. Mental deficiency can not be diagnosed by means of the Binet scale alone. This is shown in Tables I and IV, where it may be observed that some children who measure 9 and 10 years by the Binet scale are considered normal, while other children of the same chronological age, who measure 10 and 11 years mentally by the Binet scale, are considered mentally defective.¹

2. The Binet tests are an excellent means for finding out the various mental abilities of an individual. During the application of these tests much light is thrown upon the subject's general fund of information, and an opportunity is afforded to observe the quickness and the character of mental operations, emotional states, and abnormal mental symptoms.

3. The employment of selected tests is a rapid and effective method of differentiating subnormal children in schools for purpose of diagnosis.

4. Normal children 8 years of age and over should perform four movements out of six movements with the four-cube test.

5. Normal white children 12 years of age and over should perform two out of four movements with the five-cube test.

6. Normal children between the ages of 7 and 11 years should be able to repeat six digits.

7. Five-tenths of 1 per cent of 3,793 rural school children examined in New Castle County are definitely feeble-minded and in need of institutional treatment.

8. An additional 1.3 per cent of the total number were so retarded mentally as to be considered probable mental defectives and in need of institutional care.

9. A number of mentally defective children were encountered who exhibited symptoms similar to those which are observed in the adult insane.

10. It is believed, as a result of this survey, that epilepsy is a more prevalent disease than it has heretofore been thought to be.

11. The defective school children encountered in the schools of New Castle County hamper school work just as in other places. In some instances they are a real source of danger to other pupils, and many of them are in school because there is no place to put them.

12. It can not be too strongly recommended that the State of Delaware provide a home for the feeble-minded and other defective individuals who are without proper guardianship where they may be segregated and taught under proper supervision to be self-supporting.

13. It is furthermore strongly recommended that proper measures be taken for the formation of special classes to supply needful training to retarded children in the schools of the State.

¹ The writer personally believes that the term Binet-score should be substituted for the term Binet-age and that "12 points," instead of Binet-age of 12, should be considered the maximum score.